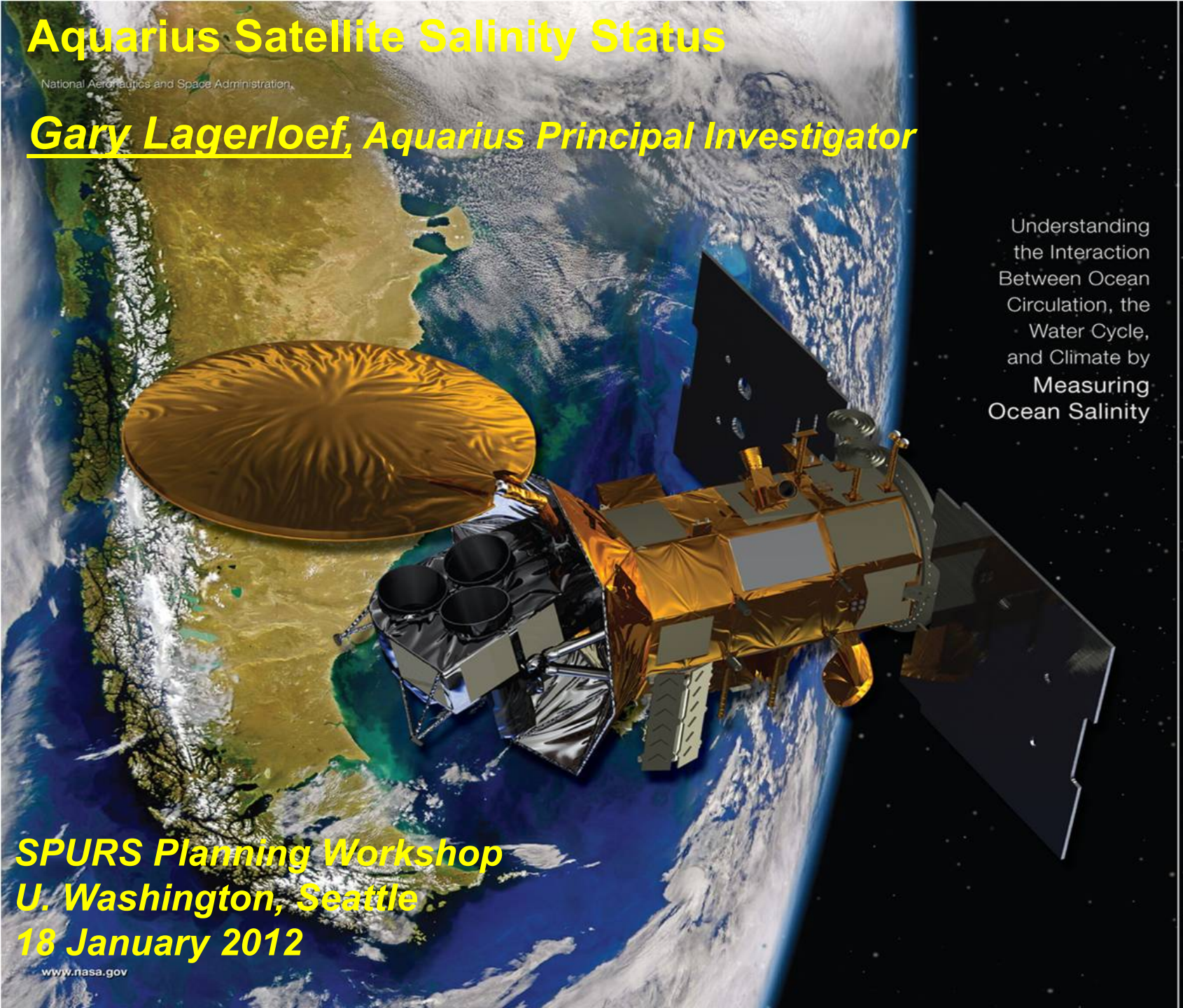
Aquarius Satellite Salinity Status

National Aeronautics and Space Administration

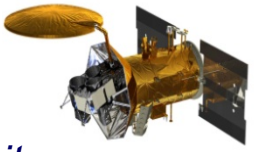
Gary Lagerloef, Aquarius Principal Investigator



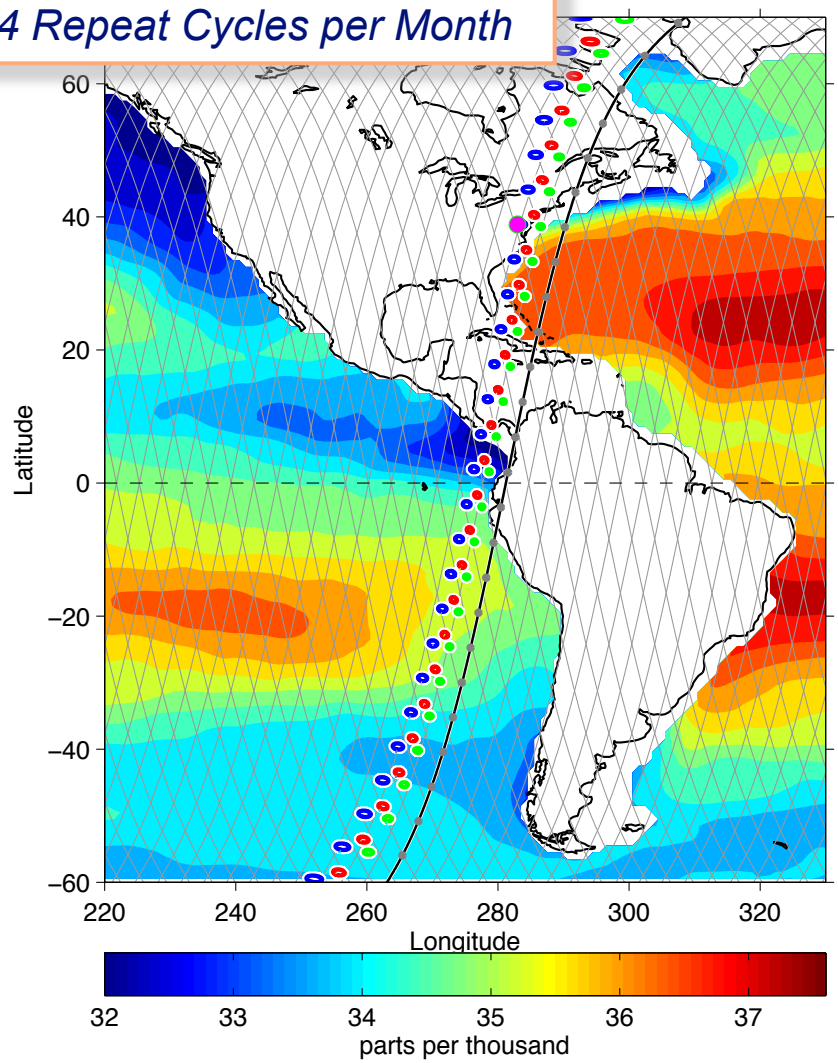
SPURS Planning Workshop
U. Washington, Seattle
18 January 2012

AQUARIUS/SAC-D

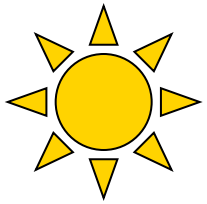
Mission Design and Measurement Approach

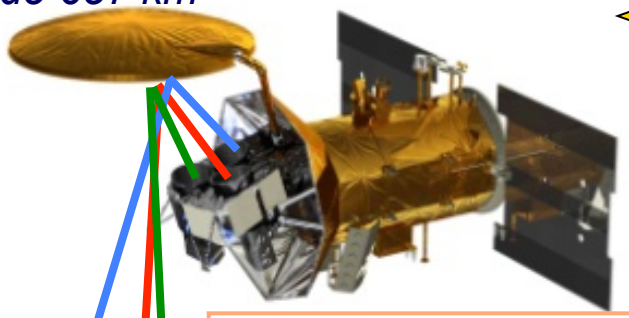


- *Global Coverage in 7 Days*
- *4 Repeat Cycles per Month*

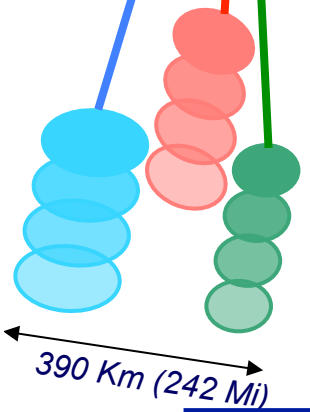


Sun-synchronous exact repeat orbit
6pm ascending node
Altitude 657 km

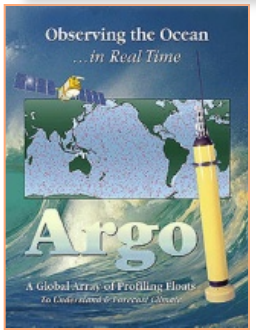




Beams point toward the night side to avoid sun glint



Science Data Validation



More than 300 surface validation observations per day

Salinity Data
150km, Monthly, 0.2 (psu)

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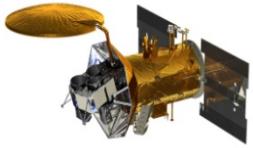
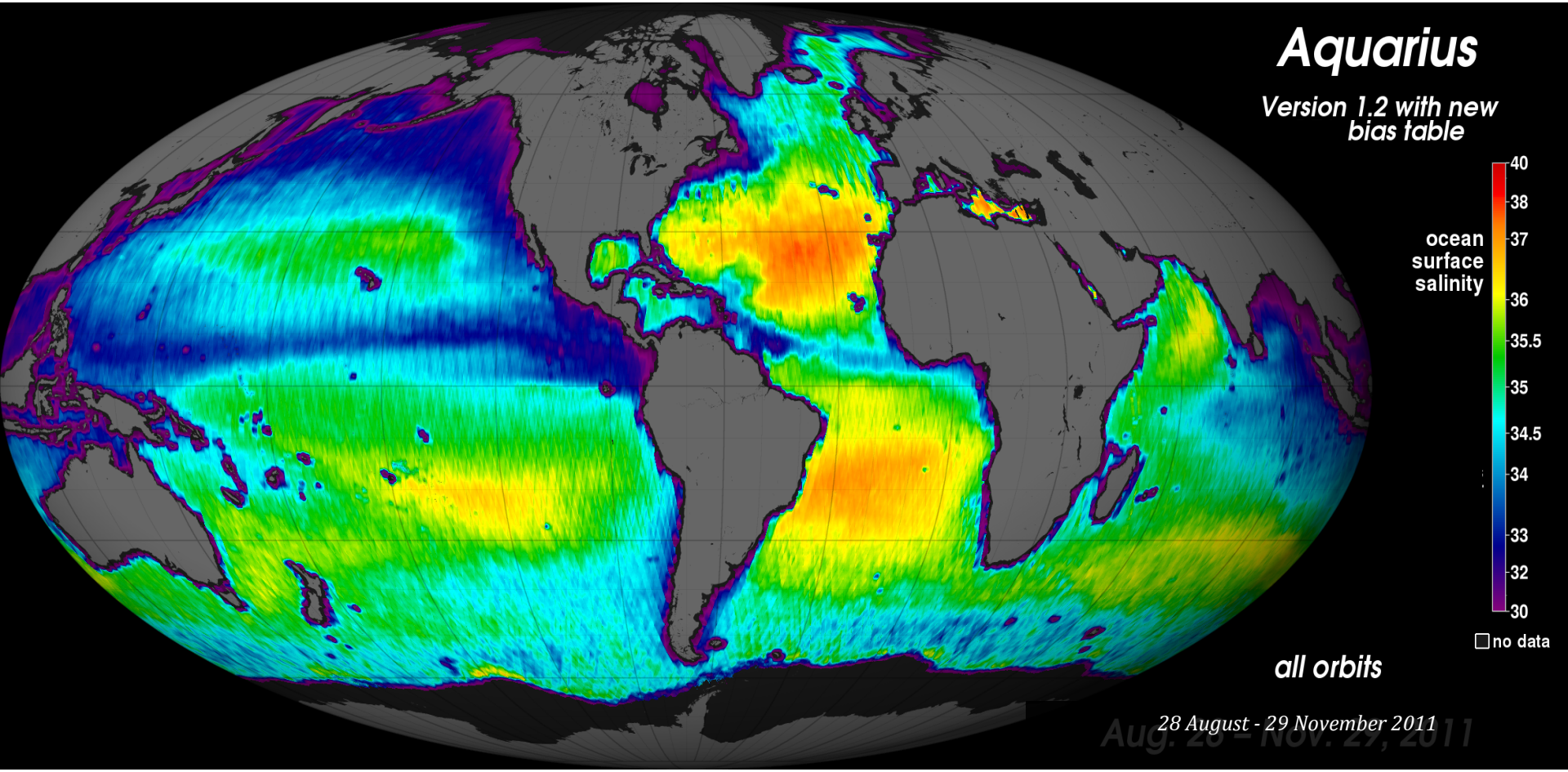
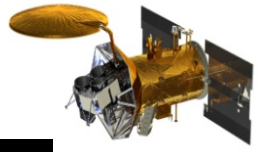
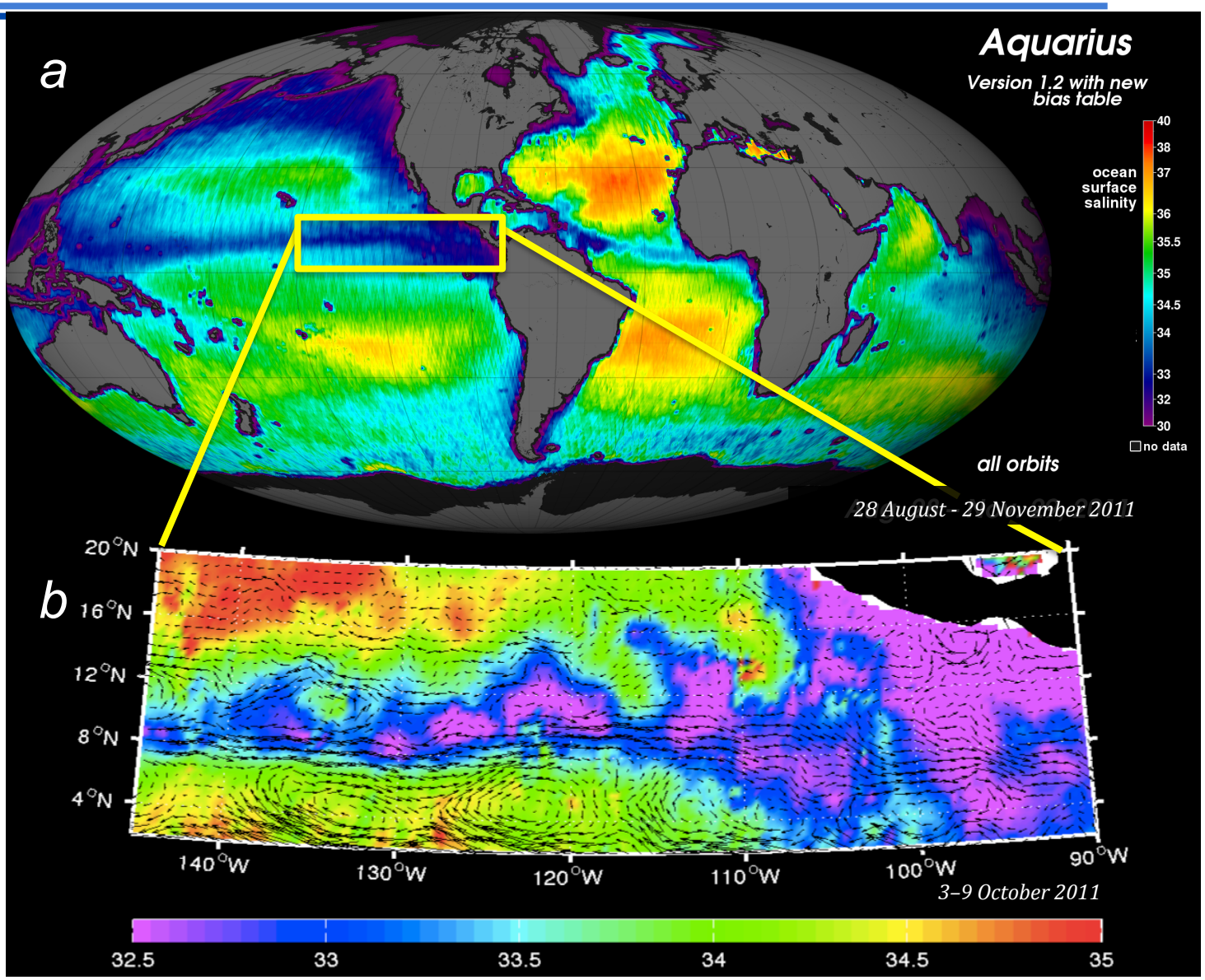
Three Month Average








a
Aquarius
Version 1.2 with new bias table
ocean surface salinity
40
38
37
36
35.5
35
34.5
34
33
32
30
no data
all orbits
28 August - 29 November 2011
b
20°N
16°N
12°N
8°N
4°N
140°W
130°W
120°W
110°W
100°W
90°W
3–9 October 2011
32.5
33
33.5
34
34.5
35

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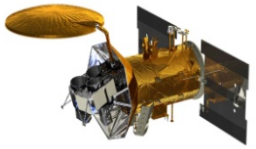
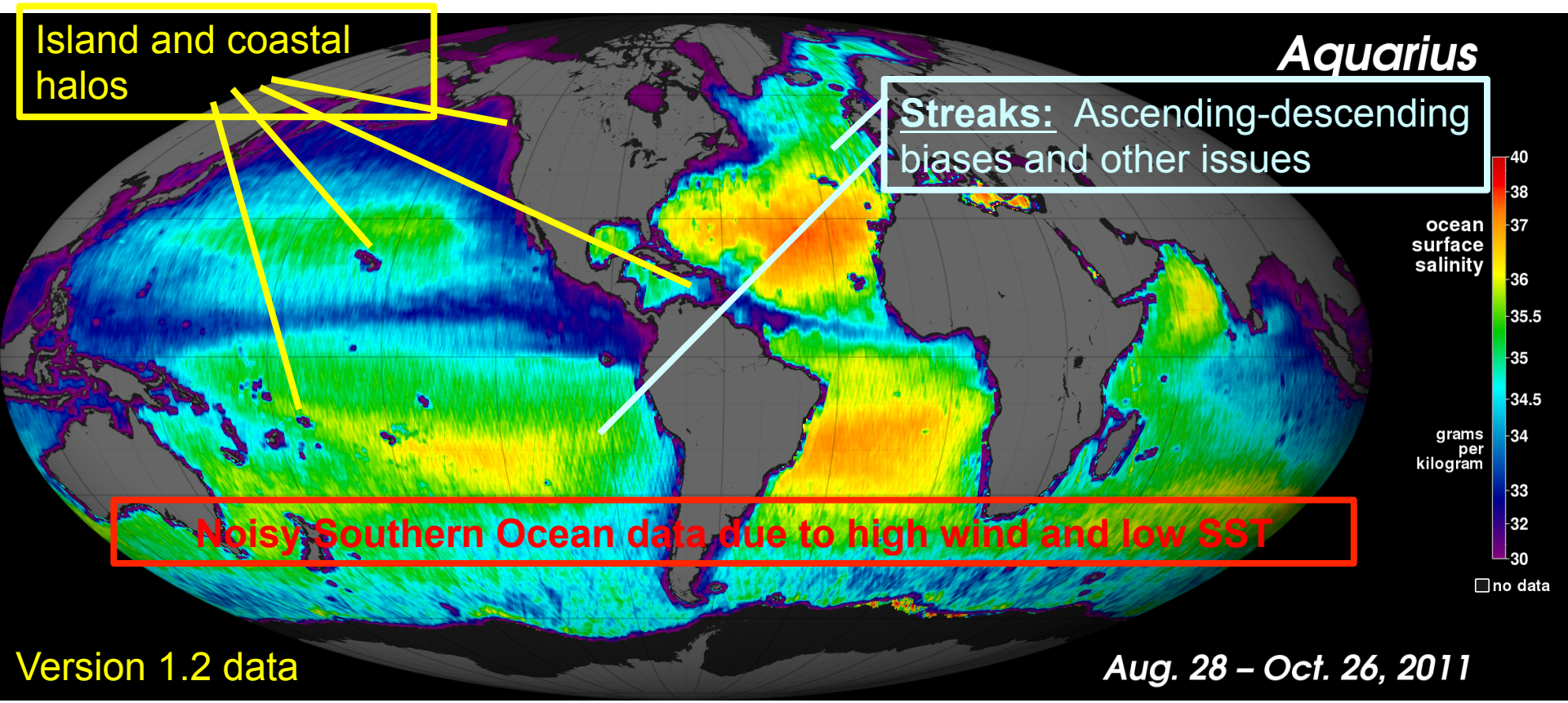
Things to be aware of …





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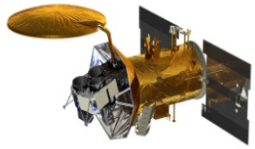
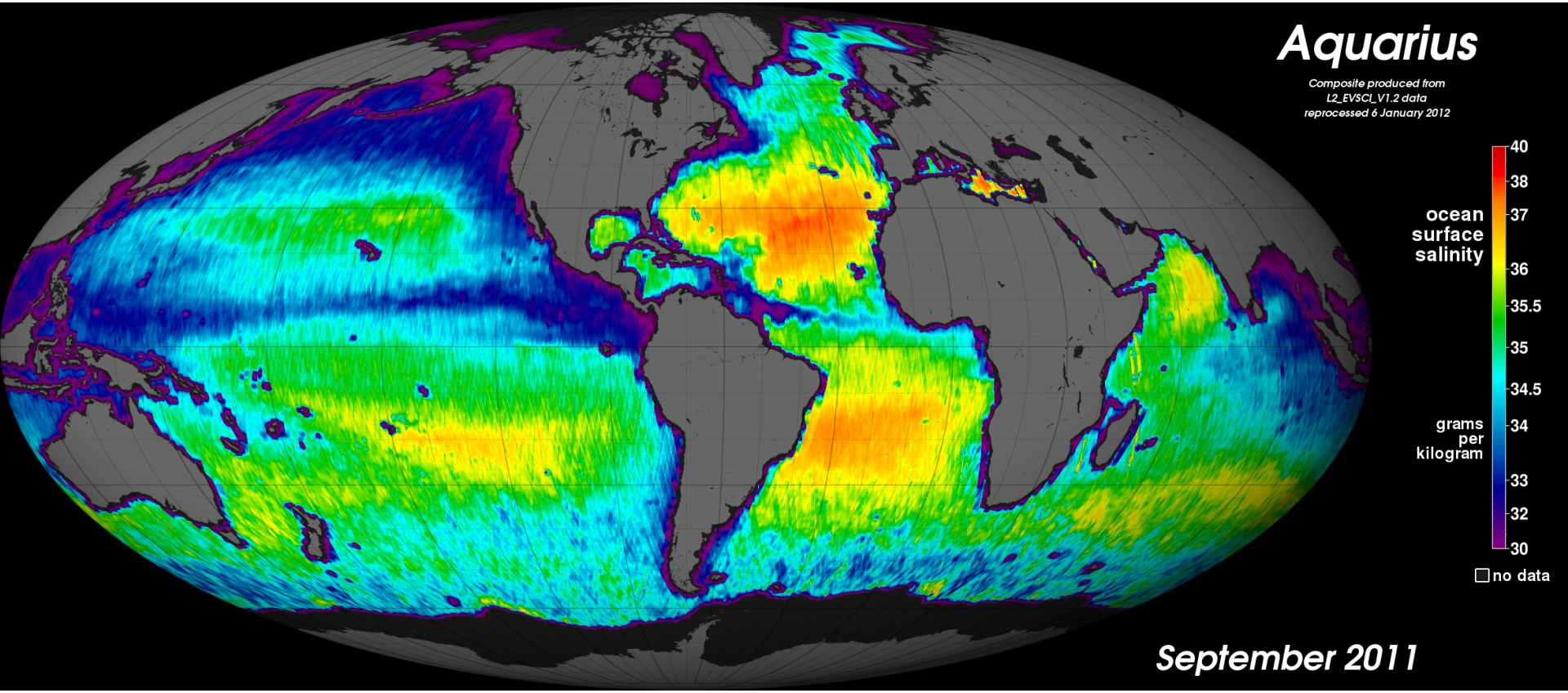
September





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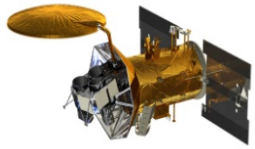
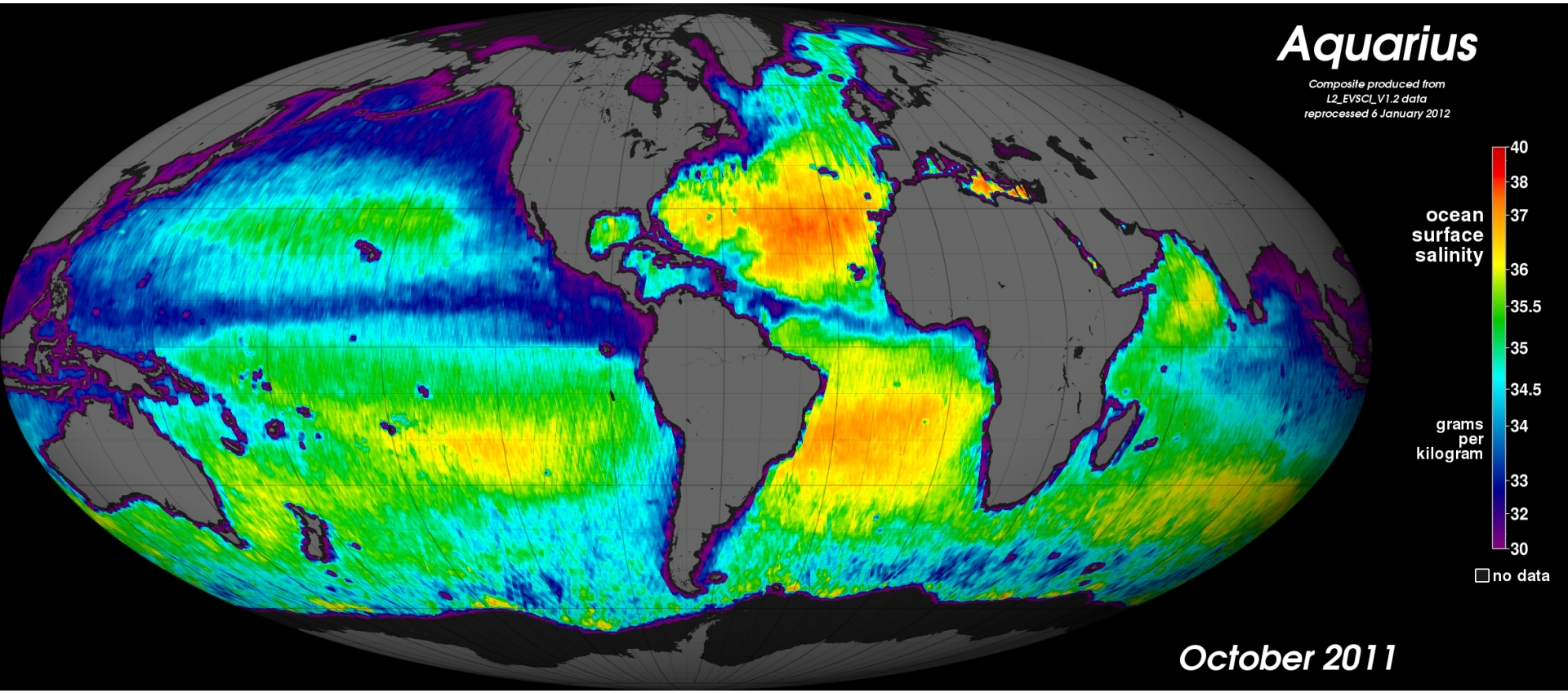
October





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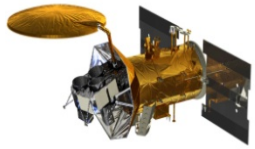
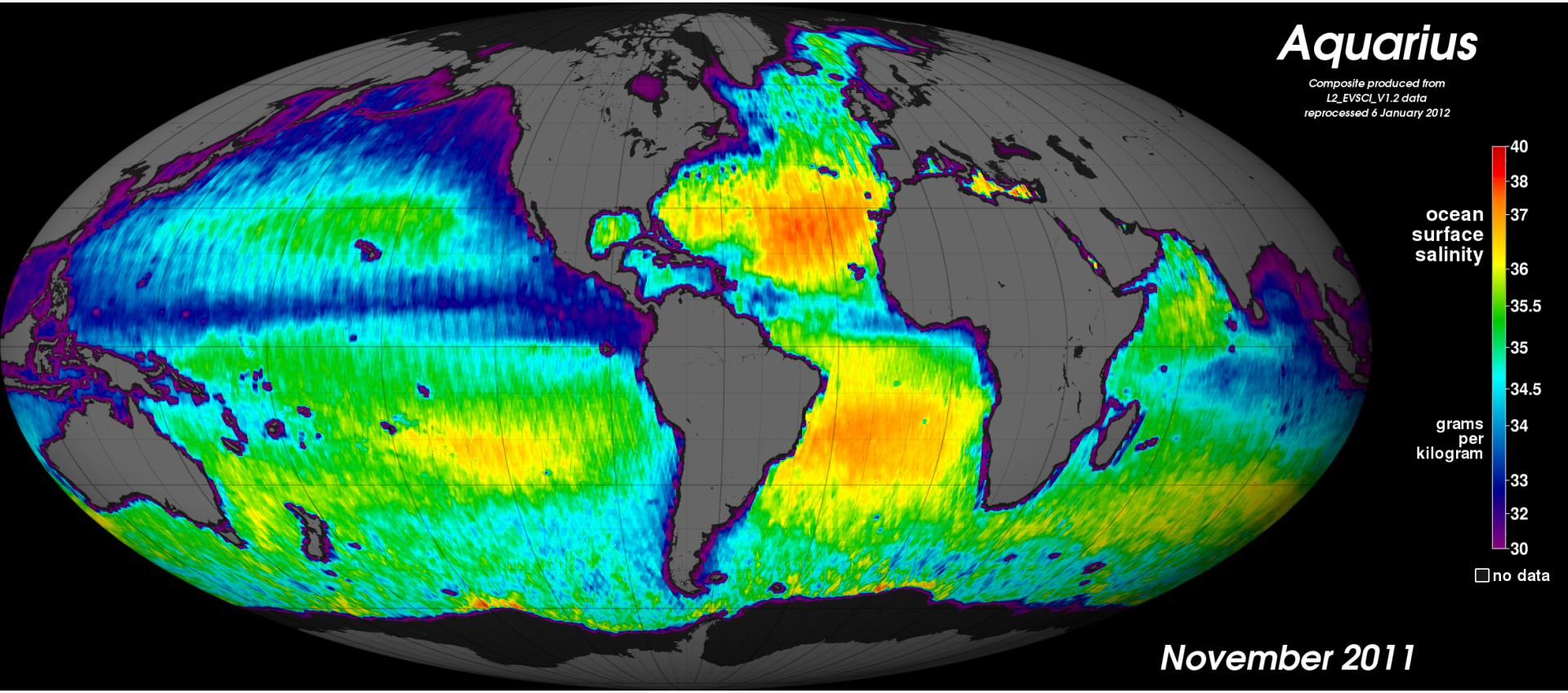
November





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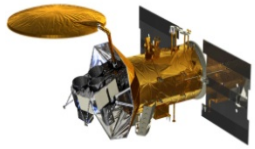
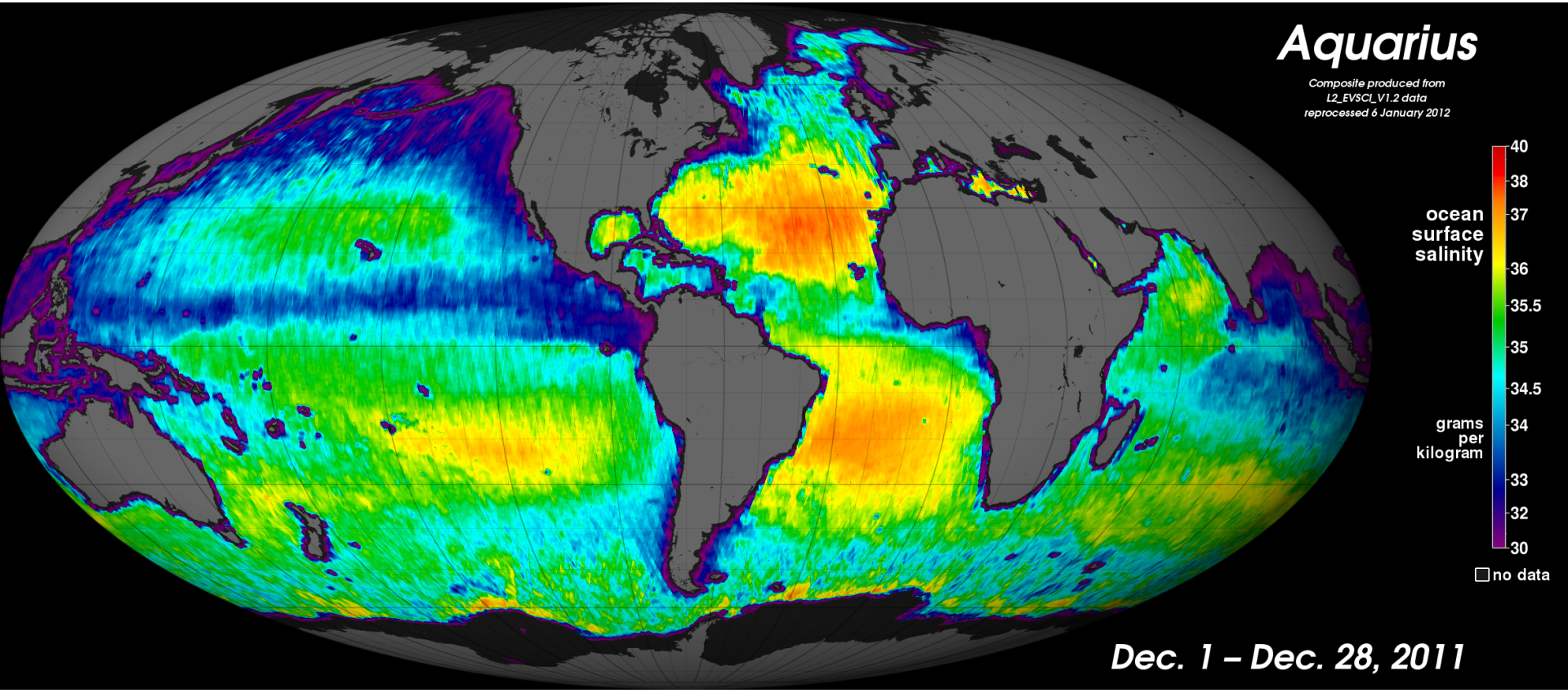
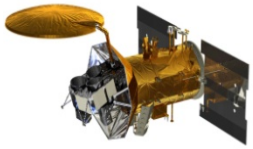
December





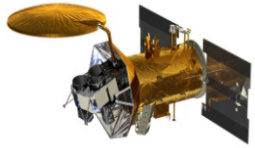
Major Issues being investigated

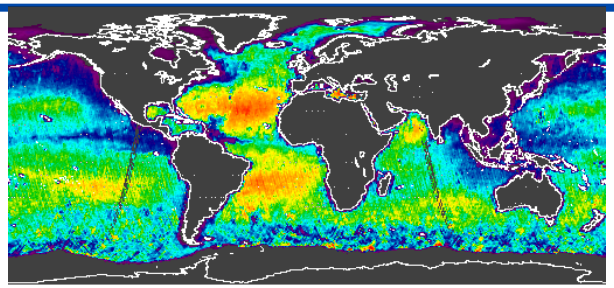


- Calibration Drift
- Roughness Correction
- Ascending – descending differences
- Regional biases (geographically correlated error)
- Pointing angle offsets (K. Hilburn, RSS)

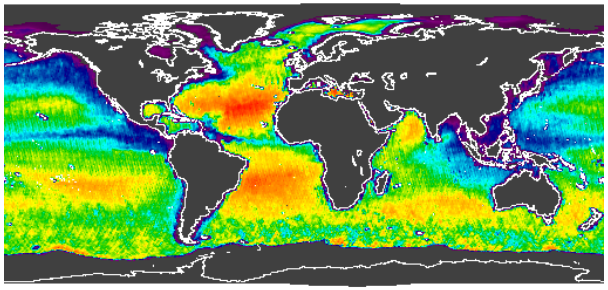
Beam	Nadir	Azimuth
1	0.55	0.10
2	0.55	0.30
3	0.55	0.00

Version 1.1 Calibration Drift

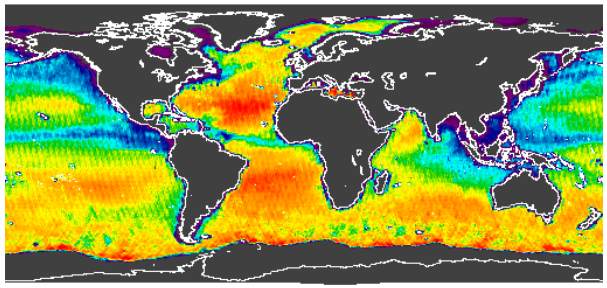




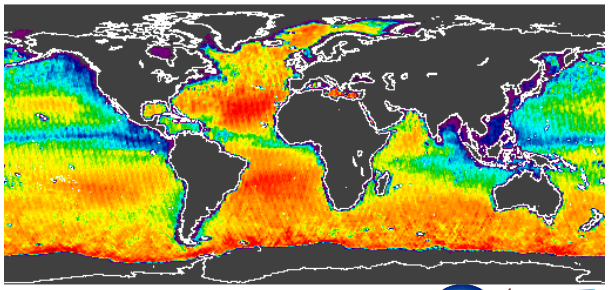
August



September

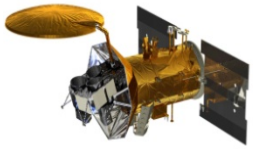


October

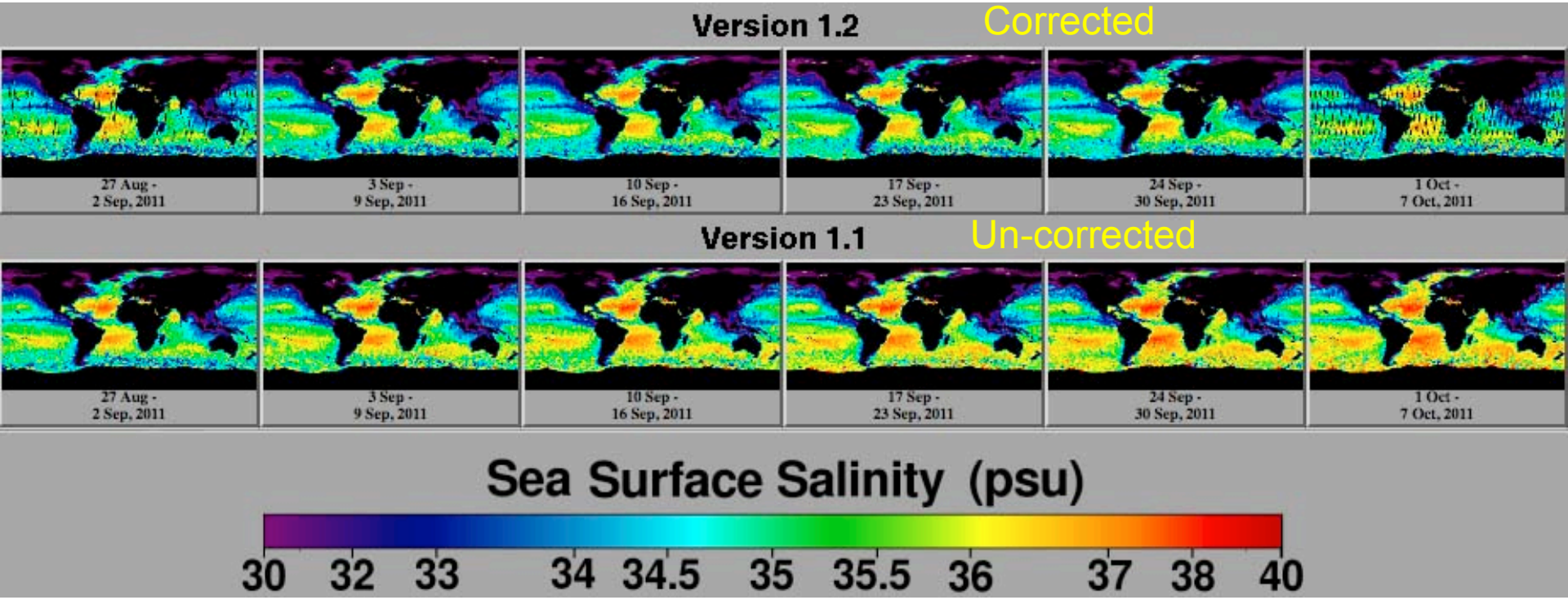


November

V 1.2 Empirical Drift Correction



- Orbit by orbit bias correction using a running 7-day global average Ta – $Ta_{expected}$, Descending passes only
- $Ta_{expected}$ is based on HyCOM model salinity and forward radiative transfer model.



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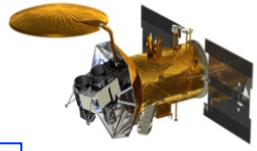
Ascending-Descending Bias

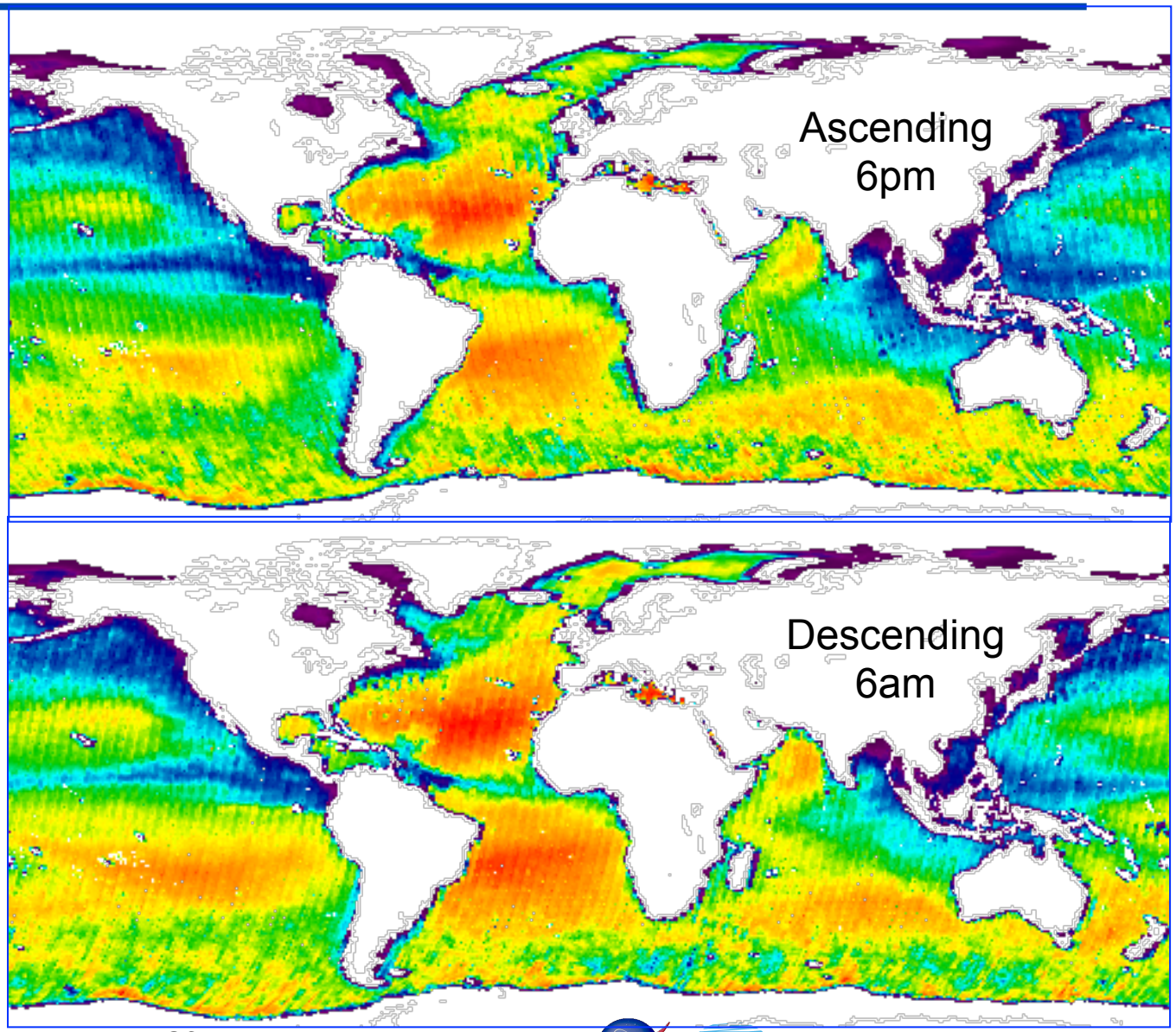


Cumulative 25 Aug thru 30 Oct

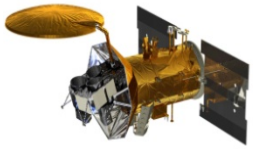
Ascending biased low relative to Descending

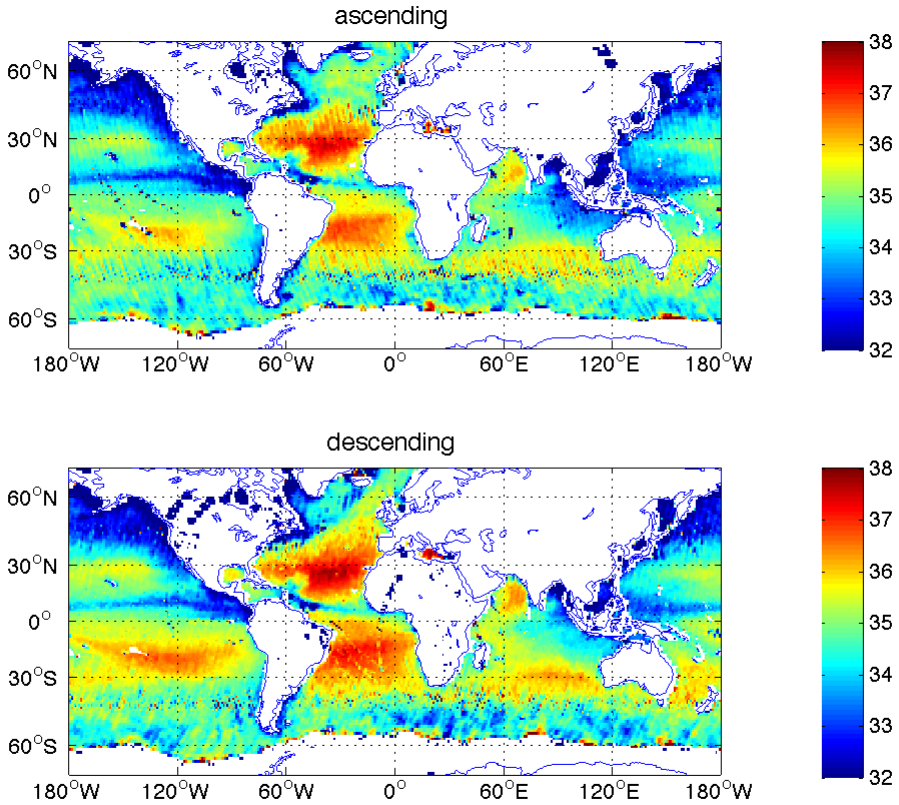
V-Pol only Retrieval

N.Kuring, GSFC



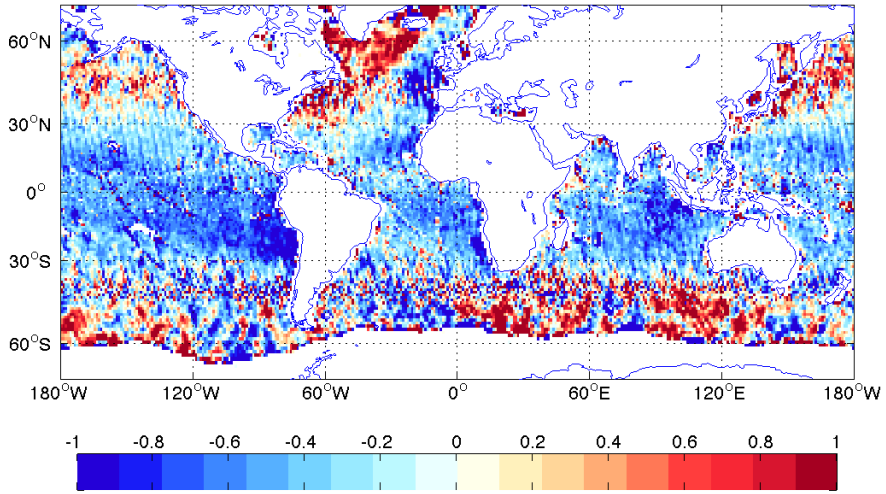
Ascending – Descending Bias





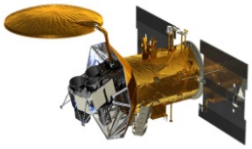
Kao & Lagerloef, ESR

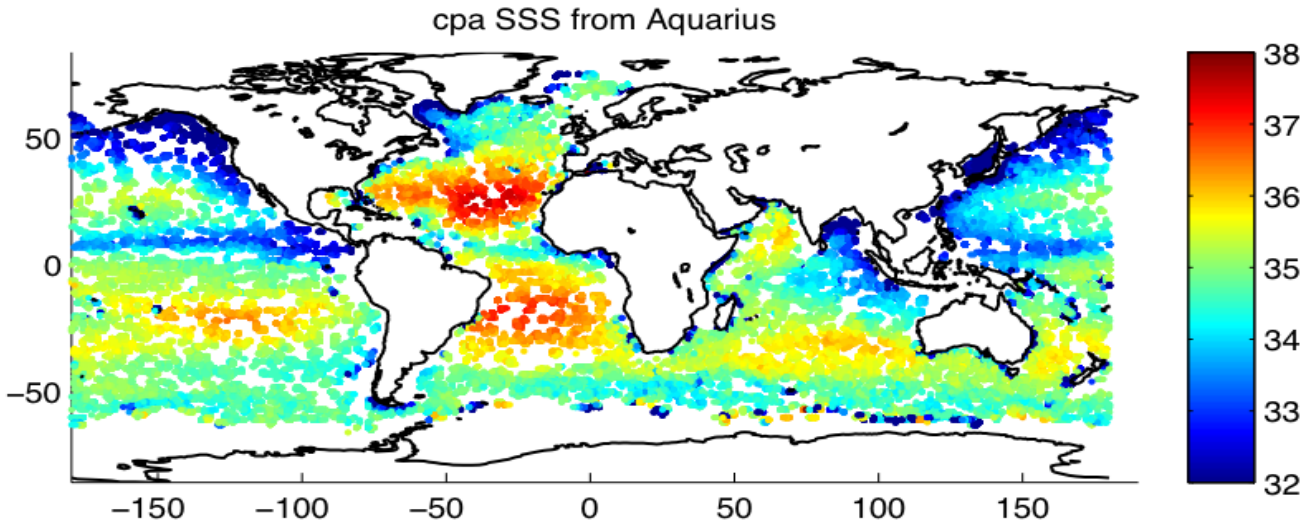
dSSS (ascending – descending)



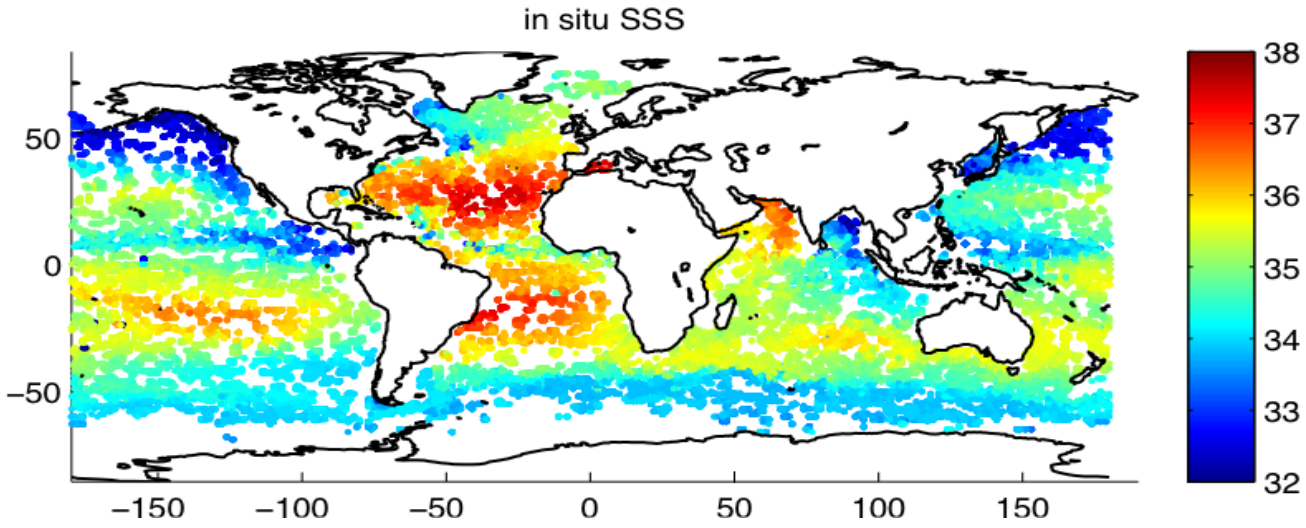
Landf/icef>0.005
roll and pitch off-nadir
(>0.2 and <-0.2 degrees)
are filtered

Composite Image Compared to Buoys





Top image:
Aquarius SSS from the last composite image at the buoy matchup locations



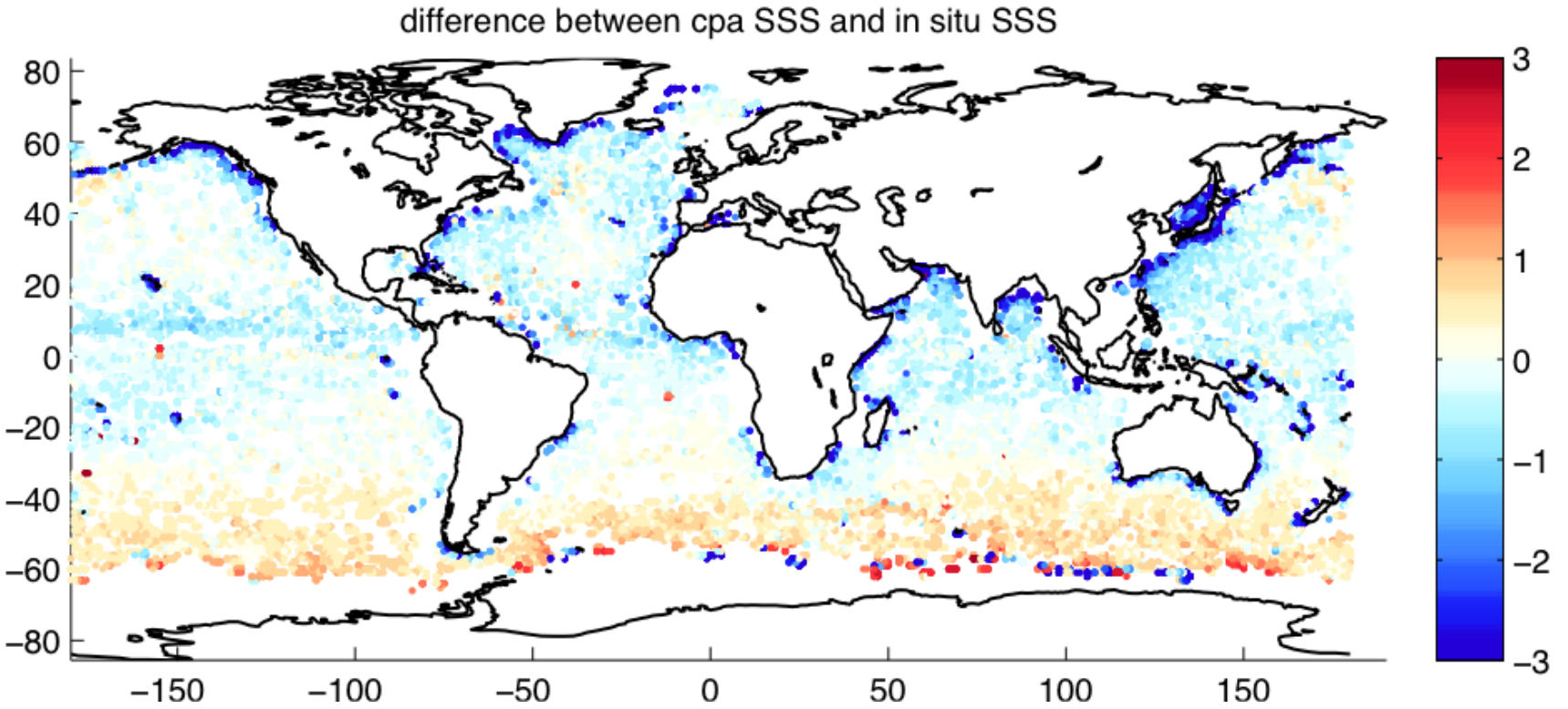
Bottom image:
Buoy SSS at the buoy matchup locations

Sep-Dec 2011 composite

Aquarius – Buoy Difference Map

09/2011-12/2011

Landfrac < 0.05

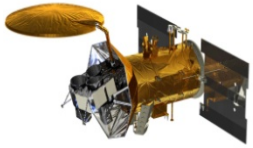


On average, Aquarius SSS is biased low in the low-mid latitudes and biased high in higher latitudes, especially the Southern Ocean.

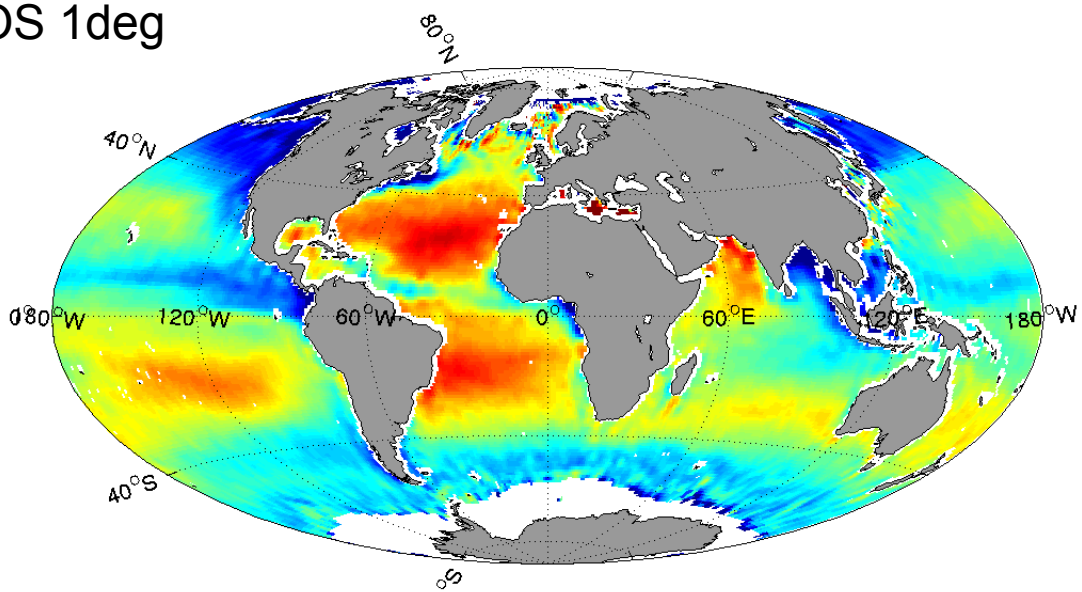
Aquarius is biased low near coastal and ice boundaries, as expected.

AQUARIUS/SAC-D

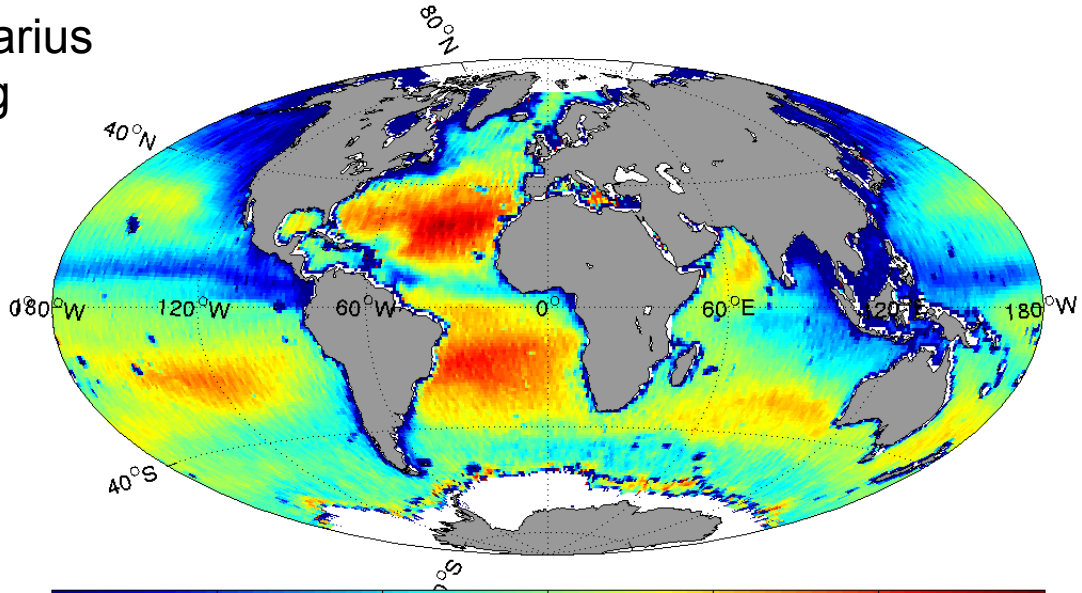
SMOS comparison

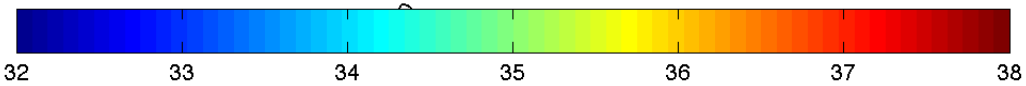


SMOS 1deg



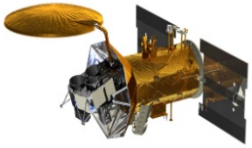
Aquarius 1deg

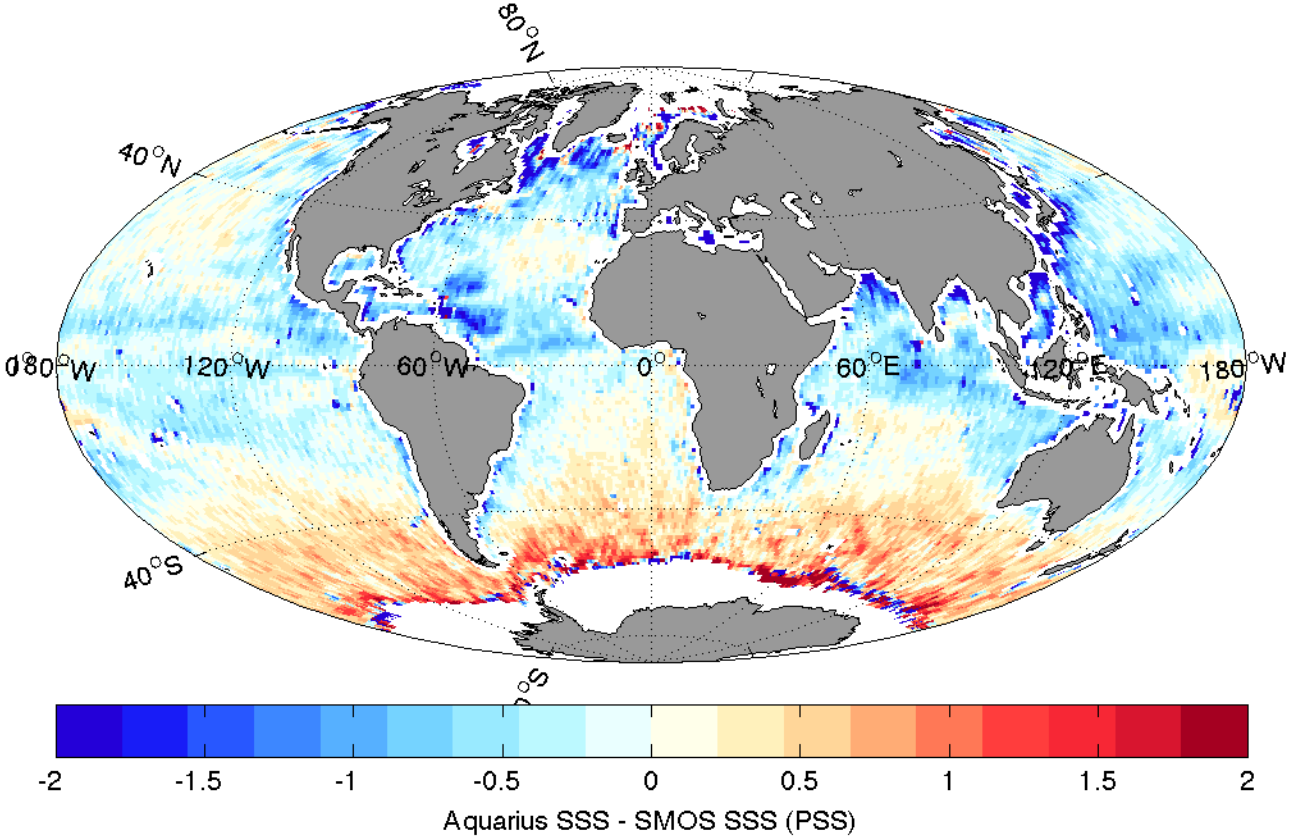




AQUARIUS/SAC-D

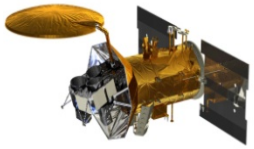
SMOS comparison

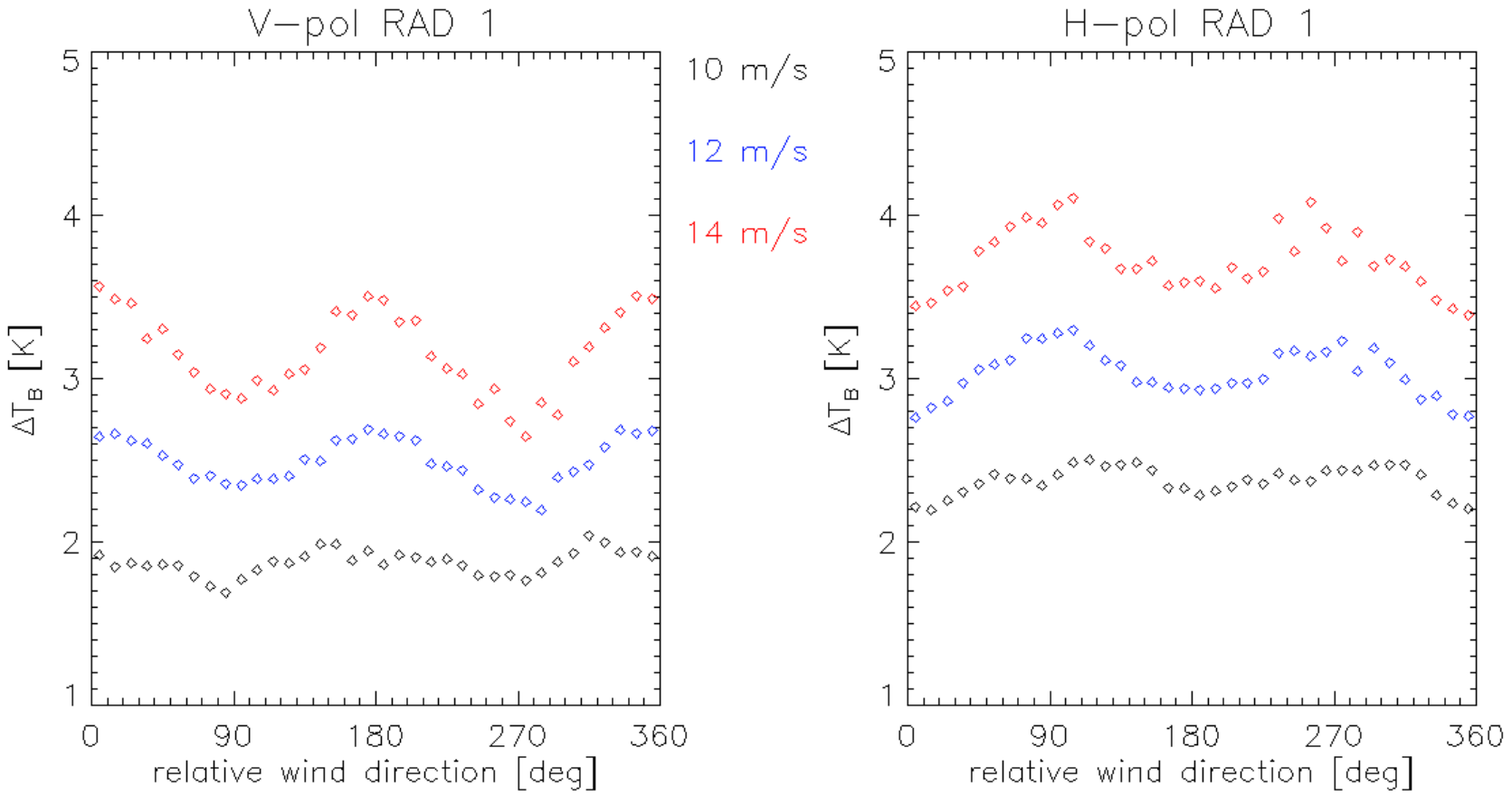




AQUARIUS/SAC-D

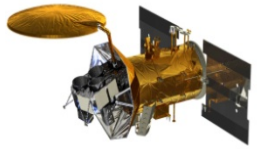
Wind Induced Emissivity: Wind Direction Signal





- Same sign and similar signature as at higher frequency bands.
- Significant magnitude above 10 m/s.
- Needs to be incorporated into retrieval algorithm.

Processing Status and Plans



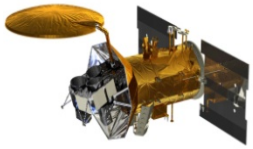
- **Running V1.1 code operationally; 2-3 day latency**
  - First post-launch re-calibrations in early September after preliminary analyses:
  - Now known to have a calibration drift relative to late August
  - Uses NCEP ancillary winds, but no wind direction applied

- **V1.2 (with empirical radiometer bias correction, updated scatterometer wind and flags).**
  - Delayed mode; currently available through 29 December 2011.
  - Expect to be phased out after V1.3 (below)

- **V1.3 expected changes in work to be released perhaps in February-March**
  - Implement internal radiometer drift correction model
  - Discontinue empirical 'reference salinity' drift correction
  - Shift from NCEP winds to hybrid with scatterometer winds
  - Implement wind direction (azimuth) correction
  - Some updates to L2 parameters and names
- **V1.4, V1.5, V1.6, …. as required**
- **V2.0 will probably be implemented later in 2012, after Buenos Aires Science Meeting.**

AQUARIUS/SAC-D

Level 2 Data Access



http://aquarius.nasa.gov/

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AQUARIUS

Sea Surface Salinity from Space

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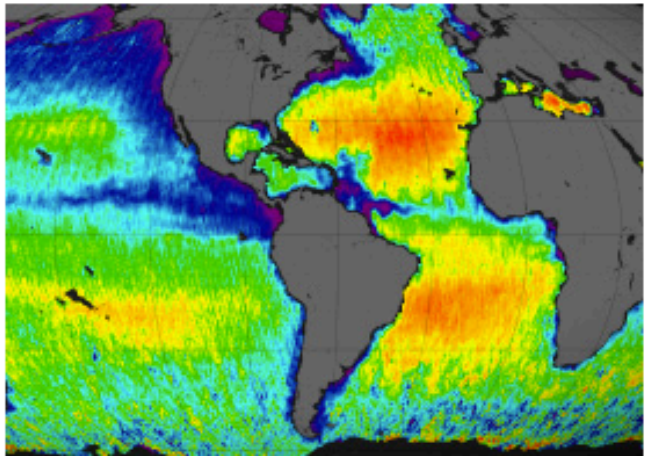
About Aquarius ▶

Aquarius is a focused effort to measure Sea Surface Salinity and will provide the global view of salinity variability needed for climate studies. The mission is a collaboration between NASA and the Space Agency of Argentina (Comisión Nacional de Actividades Espaciales). MORE >>



First Map from Aquarius

Aquarius has produced its first map of global ocean salinity. The map is a composite of the first two and a half weeks of data since the instrument became operational on August 25. Yellow and red colors represent areas of higher salinity, with blues and purples indicating areas of lower salinity. Learn more >>

AQUARIUS/SAC-D

PO.DAAC FTP Server

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AQUARIUS DATA ACCESS

If you have already acknowledged the **PO.DAAC Aquarius Product Disclaimer**, and are using one of the valid browsers* listed below, please enter your email address below. You will be taken directly to the PO.DAAC Aquarius download site.

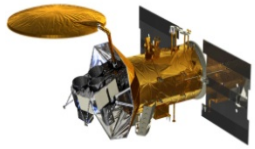
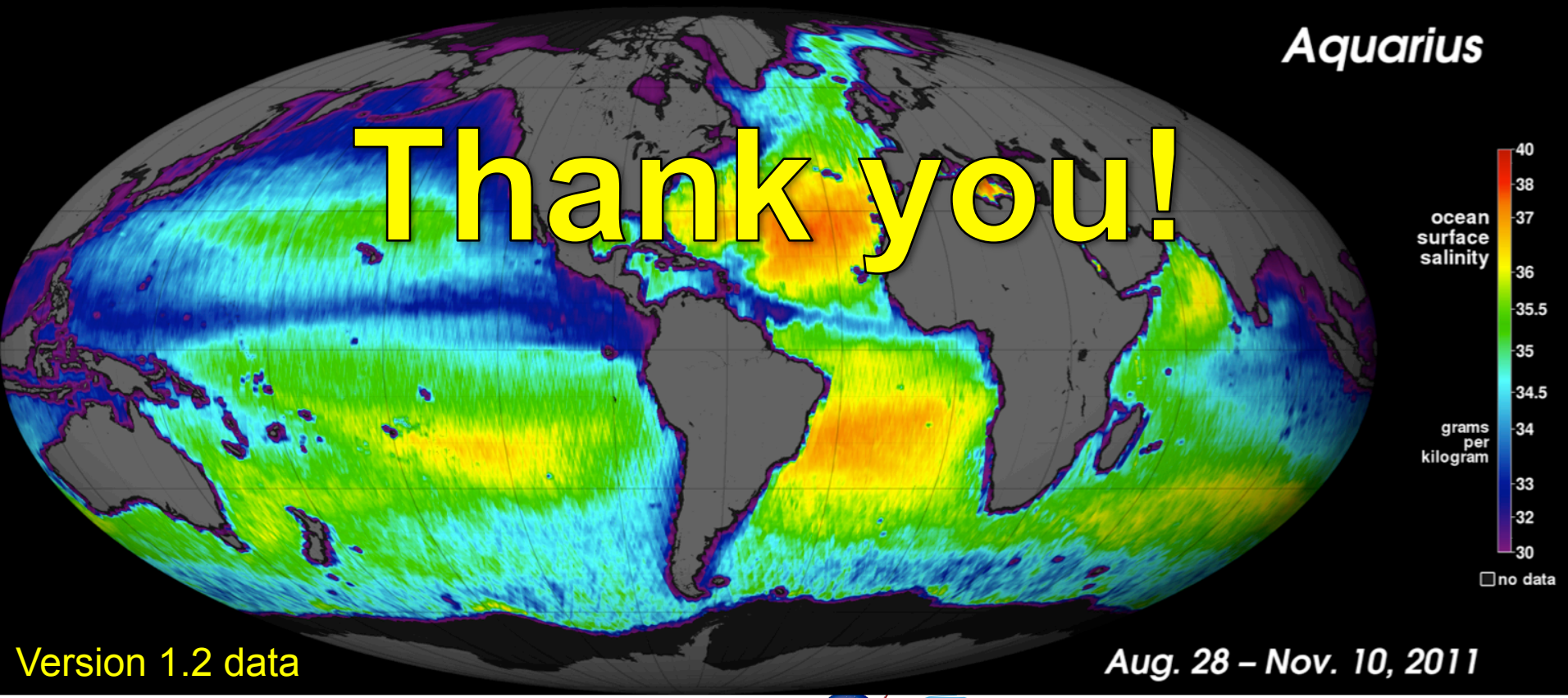
Email Address: lager@esr.org Submit

If you have not acknowledged the **PO.DAAC Aquarius Product Disclaimer**, please visit here to register.

The following Acknowledgement may be used in publications: "*Data were furnished through the NASA/CONAE Aquarius/SAC-D Project*".

***Browser access to the FTP is currently only available from: Firefox, Chrome**
If you are not using one of the valid browsers* listed above, please retrieve products via command line FTP by using anonymous as the username and your registered email address as the password at the FTP site: saltmarsh.jpl.nasa.gov

Version 1.x data policy



- Level 2 data are available for community evaluation
- Data are not fully validated.
- Frequent algorithm updates and reprocessing will occur
- Comments and feedback are welcome